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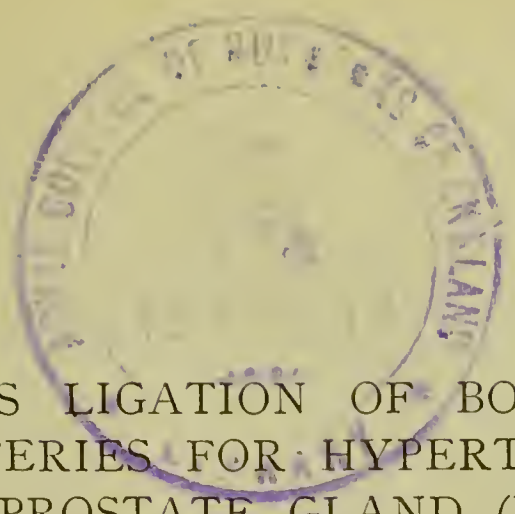
SIMULTANEOUS LIGATION OF BOTH INTERNAL ILIAC ARTERIES FOR HYPERTROPHY OF THE PROSTATE GLAND (BIER'S METHOD).

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SIMULTANEOUS LIGATION OF BOTH INTERNAL ILIAC ARTERIES FOR HYPERTROPHY OF THE PROSTATE GLAND (BIER'S METHOD).[1]

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OF all the operations which have been proposed for the radical cure of the hypertrophied prostate, none, I believe, appeals more to our sound judgment than the ligation of both internal iliac arteries. The method has suggested itself to Dr. Bier, of Kiel, first assistant to Professor von Esmarch, on considering the effects of ligation of the uterine arteries for myoma uteri, of ligation of the thyroid arteries in cases of goitre, and of ligation of the nutrient arteries in fibroid tumors of the breast. He had observed in cases of the latter kind that a fibroma had disappeared two years after the operation, and yet the woman was able to nurse her child, which had been born meantime, equally well with both breasts, there being not the slightest atrophy of the one formerly operated upon.[2] Bier concludes that it is a fact that "benign tumors of muscles, glands, and connective tissue can entirely disappear or be greatly reduced in size by diminishing their blood-supply, the function of the parts involved generally not being interfered with.

[1] Remarks made before the New York Surgical Society on April 11, 1894, presenting the patient.

[2] The operation consisted in encircling the upper and outer periphery of the breast with an incision which went down to the muscle, preparing off the breast from the underlying tissues, so that the entire organ was held by the skin bridge towards the inner and outer periphery only. All bleeding vessels and the arteries leading to the breast were ligated, and the tumor especially bluntly undermined all around. Then the breast was replaced and the skin-wound closed by suture.

Basing on this experience, he tried the same kind of surgical interference for the sake of reducing the hypertrophied prostate. Which vessels should be ligated? Branches of the internal pudic and median hæmorrhoidal arteries (Adams), also of the inferior vesical (Thompson), feed the prostate. There are many anomalies in their origin. Surgically, all these branches cannot be easily reached or found. It was therefore necessary to ligate the main trunks,—the internal iliacs,—best simultaneously. To apply the ligature below the branching off of the superior gluteal artery would unnecessarily complicate the operation.

An article giving a *résumé* of Bier's experience with ligation of the internal iliacs for reduction of hypertrophy of the prostate appeared in No. 32 of the *Wiener klinische Wochenschrift*, August 10, 1893. Bier had then done the operation three times,—once by the transperitoneal method (Gibson), twice by the extraperitoneal method (Valentine Mott). Much difficulty was experienced during the first operation on account of a troublesome narcosis, it being necessary at last, in spite of Trendelenburg's posture, to take out a large portion of the small intestine in order to reach the arteries. Considerable time was thus consumed. The patient died of septic peritonitis on the third day after the operation. The latter two patients, sixty-five and sixty-nine years old, recovered nicely. Two of the three had been able within the first twenty-four hours following the operation to pass urine voluntarily in a small stream; the third began to pass it on the third day after the ligation of the arteries, while before they had been unable to pass a drop. In one of the cases intermittent retention occurred again on the third day after the operation, lasting nine days. Then the urine was again voided spontaneously. In the two cases which survived there was afterwards progressive improvement. One of the patients stated, four months later, that he could urinate just as well and as easily as ever before. No trouble had resulted from the ligation as such.

While I was under the impression produced by Bier's article, a patient, a man fifty-five years old, came under my care at the German

Hospital, October, 1893, who had had marked urinary trouble for over four years. When a young man he had suffered from gonorrhœa four times; the last attack was twenty years ago, when at one time he had been unable to urinate. He was relieved by the catheter. In 1864 he had contracted syphilis. Increasing difficulty in micturition was first noticed six years ago. In 1890 retention set in for the first time. A good deal of gravel was passed. He had been unable to pass a drop of water the past six months, using the catheter altogether. Examination revealed general hypertrophy of the prostate; the upper border of the gland could just be reached by forced rectal digital examination. Urine purulent. To verify the diagnosis by ocular inspection cystoscopy was performed. There was the characteristic picture of hypertrophied prostate with marked *vessie à colonnes*. Turbulent urine was seen coming down from both ureters, thus confirming the result of the urinary examination,—pyelitis (bilateral). The bladder easily held a quart of fluid. Length of the urethra, twenty-three and a half centimetres; patient very stout; weighed two hundred and thirty pounds.

On October 5, I proceeded to ligate the internal iliac arteries, as suggested by Bier. I first operated upon the left side. The patient lying upon his back, an incision, slightly concave inwardly and five inches long, was made parallel with the upper third of Poupart's ligament running up towards the inner end of the eleventh rib. The common and internal iliacs were reached without much trouble. Two hands of the assistant were needed to hold back the peritoneum with the large amount of the properitoneal fat. After dividing the sheath of the internal iliac (the wall of which was elastic, not atheromatous), it was separated from the vessel by a strongly-curved blunt hook, and a catgut thread thrown around the vessel by means of an aneurism-needle. At this point hæmorrhage was observed, coming from above from the just strongly-flexed anterior wall of the vessel. (In trying to find out the cause of this accident I believe it to have been due to my having unintentionally used a curved scalpel when dividing the sheath of the vessel. It had been handed to me by the assisting nurse. The cut, which should have divided the thin sheath only, thus caused, down in the deep funnel of the wound, a slight injury of the vessel. It would have been better to have used a straight scalpel.) The assistant at once compressed the common iliac with his finger, while I quickly disengaged the thread from the eye of the aneurism-needle, cut it in two, and tied first the distal, then the proximal end of the vessel, about one-quarter of an

inch apart from the small wound in its wall, which could be very plainly seen. On account of the direct descent of the internal iliac after its branching off from the common, also on account of the great depth of the wound, I did not succeed in putting the ligatures farther apart. Now the artery was divided with the scissors between the two threads. The hæmorrhage had ceased. Suddenly it again set in in a most alarming way. Again the common was compressed by the assistant's finger, when it was seen that the ligature had slipped from the proximal (cut) end of the internal iliac. Further attempts at properly placing a ligature proving futile and bleeding continuing, I applied a long artery-forceps, for safety's sake on each end of the divided vessel, and left them in place, surrounding them carefully with gauze. Their ends projected from the middle of the abdominal wound. After closing the wound on this side, above and below the two forceps, by suturing the different layers separately with cat-gut, I proceeded to make a like incision on the right side. The operation was made a great deal easier here by placing the patient in Trendelenburg's posture as soon as the peritoneum had been reached. The sheath of the internal iliac was opened, loosened for about one inch, and a double catgut ligature applied. On account of the comparatively short space between the two ligatures, I deemed it the wisest not to divide the artery between them, but to trust to occlusion by thrombus. The wound was entirely closed by suture without drainage, stitching layer by layer, and covering the sutured skin-wound by a strip of iodoform gauze and collodion. The patient made a good recovery. He had not suffered materially from the loss of blood. The first dressing was changed on the fifth day, when the two clamps were easily removed and the surrounding gauze extracted. No hæmorrhage took place. The sutured wounds had healed by primary intention throughout, the track of the forceps alone remaining open on the left side.

On the evening of the twelfth day the patient suddenly noticed a hot feeling on the left side; secondary arterial hæmorrhage had set in. The well-trained nurse, who had been with the patient all the time, made compression at once, and continued the same until the patient had been brought to the operating-room, where the house-surgeon after proper disinfection introduced his finger down to the depth of the bleeding canal and compressed the vessels as well as it could be done. Meanwhile, one had sent for me. When I arrived at the hospital, I placed the patient in Trendelenburg's posture, opened and enlarged the outer wound, and found to my surprise the following

interesting condition: The hæmorrhage had not come from the internal iliac, but from the external iliac. On account of a slight change of position on the part of the patient's pelvis, I believe, probably due to the great softness of the mattress of the bed, the forceps, though carefully surrounded by gauze, had caused pressure-necrosis of the external iliac at the spot where it had crossed the same. This had led to the hæmorrhage. There was a defect of about half the size of a ten-cent piece in the anterior wall of the external iliac just below the bifurcation of the common. While the assistant now continued to make pressure on the common, I ligated the external iliac below the perforation and then the common iliac. Catgut cut the vessel twice in different spots. It was necessary to enlarge the wound upwardly, strip off more of the peritoneum, and ligate the common iliac close to the aorta. This time braided silk was used. The bleeding was successfully checked.

Soon after the operation gangrene of the toes and a part of the metatarsus developed, which later necessitated irregular amputation of the anterior portion of the foot.

With reference to the influence of tying both internal iliac arteries upon the hypertrophied prostate in my patient, I have to state the following: Twelve hours after the operation the patient began to pass his urine—two ounces—in a very fine stream voluntarily for the first time within six months.[1] During the following fifteen days he frequently voided small quantities through the urethra, but also had to be catheterized. On October 23 he commenced to pass larger amounts at a time with a satisfactory stream; largest quantity was on October 23, 350 cubic centimetres; on the 24th, 240 cubic centimetres; and on 25th, 550 cubic centimetres. He urinated every one to two hours. On October 26, 130 cubic centimetres having just been voided, the catheter withdrew 730 cubic centimetres of residual urine. Two days later 225 cubic centimetres were voluntarily passed at 1 A.M., 110 at 3 A.M., and at 5 A.M. the catheter withdrew a full quart of water. The muscular power of the bladder evidently was greatly reduced (atony). Yet continuous retention did never set in again after the operation had been performed. As soon as the foot had healed, and the patient began to walk about, he regained better power

[1] As mentioned above, the same phenomenon had been seen in two of Bier's cases. He concluded, no doubt with propriety, that the sudden reduction of the afflux of blood had diminished the size of the gland.

over the bladder. At present he is able to go two hours,[1] and then pass ten to twelve ounces in a forcible stream. Residual urine is still considerable, ten to twenty-four ounces. I am convinced that atony is the only cause of the patient's present inability to completely empty the viscus. The prostate on rectal palpation is markedly smaller than before the operation, almost normal in size. The length of the urethra, which was twenty-three and a half centimetres before the operation, has been reduced to twenty-one and a half centimetres within the six months the patient has been under my care. (Twenty-one centimetres is the length of a normal urethra.)

Certainly the result obtained in this case is encouraging in the extreme. I shall, no doubt, continue to operate on the same plan[2] in suitable cases,—viz., patients with "recent" retention where marked dilatation with atony has not yet set in, as Bier did in his three cases. But in order to simplify the act of ligation I shall henceforth use silk, and apply only one ligature after having opened the sheath. Or, should I again find it difficult in very stout patients to denude the vessel from its sheath to a sufficient distance, I shall not open the sheath at all, but throw the silk thread around the vessel *and* its sheath. The internal iliac artery and internal iliac vein have a separate sheath. In ligating the artery "*in its sheath*," wounding the vein and also

[1] At the time of leaving the hospital (April 28), three to four hours. It is to be hoped that with proper treatment the condition will improve still more.

[2] Three weeks ago, on May 21, I operated according to this plan on a man, sixty-three years of age, with retention, due to hypertrophy of the prostate. A single silk ligature was easily placed around each artery within its sheath and tied. The two wounds were sutured with catgut, layer by layer. The operation had been done aseptically. No reaction; primary union. Patient voided his urine in a fine, but forcible stream a number of times during the night following the operation. The bladder, which had reached up to the umbilicus before, could not be percussed above the symphysis any more. Retention did not set in again. On the fifth day after the operation the patient suddenly developed subnormal temperature without any apparent cause. This phenomenon increased in spite of suitable treatment. Patient died in a comatose condition on the eighth day after the operation. A very limited autopsy was permitted only. The internal iliac arteries did not show arterio-sklerosis; however, one common showed an atheromatous (macroscopical) deposit. Silk-ligatures aseptically healed in place. No thrombus whatever in the arteries on either side of the ligature. In the other one a thrombus three-quarters of an inch to one inch in length had formed in the afferent and efferent part of the vessel. It was adherent to the wall; it did not reach up to the bifurcation of the common. Certainly the functional result of the operation had been all that could have been desired.

the artery can thus be easier avoided. As just mentioned, I shall utilize silk for material. The possibility of reabsorption being thus out of place, one single ligature will suffice to permanently cut off this direction of the blood-current. It will then be unnecessary to apply a second one and divide the vessel between.

The fear, which at once suggests itself to our mind, that atheromatosis might be present in the wall of such large arteries in old patients, and cause primary or secondary hæmorrhage, is not borne out by facts. Bier found in the five internal iliac arteries which he tied for hypertrophy of the prostate thoroughly normal and soft walls. (He also found normal arterial walls in examining the prostate of the patient who died,—No. 1.) The same was noticed by me in my patient. It is well known that Lannois and Guyon are of the opinion that hypertrophy of the prostate, and other diseases of the urinary system connected with the same, were caused by general and local arterio-sclerosis. Lately Casper[1] has shown this assumption to be unfounded. By a series of very careful researches he comes to the conclusion that hypertrophy of the prostate and arterio-sclerosis of the genito-urinary system are often found in the same patient. Yet the one process is not the consequence of the other one.

The causative element for hypertrophy of the prostate has to be looked for, it seems, in the vascular system. The rapid decrease in the size of the swollen gland after ligation of both internal iliac arteries points in that direction; also, as it seems to me, the shrinking of this gland after double castration. F. Ramm, of Christiania, who first published this observation,[2] refrains from giving an explanation for this phenomenon; he only concludes that the prostate gland belongs to the genital system. A plausible explanation, I believe, is that the enlarged prostate steadily shrinks, as soon as the frequent intermittent active hyperæmia of the genital system, or rather of the genito-urinary system, which is produced by the presence and secretion of the testicles by ner-

[1] Zur Pathologie des Tractus urogenitalis senilis. Virchow's Archiv, Vol. CXXVI, I, No. 9.

[2] Centralblatt für Chirurgie, 1893, No. 35, page 759; here the author's name is wrongly spelled, "Rocum;" and Centralblatt für Chirurgie, 1894, No. 17, page 387.

vous reflex, is eliminated by castration. Perhaps the same result, —viz., progressive atrophy of the prostate—might be more easily and simply accomplished by dividing or resecting the spermatic nerves, provided we have determined to sacrifice the patient's virility. Certainly the physiological fact is of great interest, and will also be of practical importance in a number of cases, that double castration produces atrophy of the prostate. Yet, if experience will show that cutting off the direct blood-supply is a reliable remedy for this frightfully troublesome, so often deadly, disease,—viz., hypertrophy of this organ,—it must and will be better surgery, at least in the majority of cases, to ligate both internal iliac arteries than to deprive the patient of his sexual power.

With reference to the operation itself the double extraperitoneal incision will, no doubt, be preferable to the single transperitoneal. It must be remembered that in almost all the cases which have to be subjected to this kind of operation we have to deal with old, often very stout, subjects, with fatty degeneration of the heart, etc., who bear intraperitoneal interference not so well as younger ones.

If further observations should be equally satisfactory in regard to the final result, simultaneous ligation of the internal iliac arteries must necessarily become the standard radical operation for hypertrophy of the prostate. For it leaves the parts in their normal anatomical relation, and removes the obstruction in the simplest way: by producing progressive atrophy of the organ which causes the obstruction. It also keeps the generally old patients in bed for only ten to fourteen days, the wounds healing by primary union under the first dressing. The wounds which open bladder or urethra for attempting a radical cure of the hypertrophied prostate do not heal *per primam* and keep the patients in bed for a number of weeks. Hypostatic pneumonia is the threatening foe.

Of course, it has to be seen yet how far collateral circulation will later interfere with the result first obtained. Yet from experience made with the ligation of the feeding arteries of tumors in other parts of the body, it seems safe to predict "a progressive and permanently lasting atrophy of the prostate by ligating both internal iliacs for its hypertrophy."